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United States Patent [19]**Khamis et al.**[11] **Patent Number:** **5,930,729**[45] **Date of Patent:** **Jul. 27, 1999**[54] **RANGE EXTENSION ACCESSORY
APPARATUS FOR CELLULAR MOBILE
TELEPHONES**[75] Inventors: **Elias G. Khamis**, Newport Beach;
Massimo Massa, Placentia, both of
Calif.[73] Assignee: **Pacific Cellstar, Inc.**, Irvine, Calif.[21] Appl. No.: **08/657,809**[22] Filed: **May 31, 1996****Related U.S. Application Data**[63] Continuation-in-part of application No. 08/340,242, Nov.
16, 1994, Pat. No. 5,649,009, which is a continuation-in-part
of application No. 08/062,577, May 17, 1993, Pat. No.
5,422,934.[51] Int. Cl.⁶ **H04M 11/00**[52] U.S. Cl. **455/571; 455/11.1; 455/20**[58] Field of Search **455/11.1, 20, 571,
455/572, 575, 556, 557, 127**[56] **References Cited****U.S. PATENT DOCUMENTS**

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Primary Examiner—Edward F. Urban*Attorney, Agent, or Firm*—William L. Chapin[57] **ABSTRACT**

An accessory apparatus for mobile radio telephones, particularly those used in cellular networks, permits utilization of the full communication range capability of a vehicle-mounted cellular radio telephone by a cordless portable handset remote from the vehicle. The apparatus includes a plug-in adapter unit located in a vehicle and interconnected between the existing handset and transceiver of the vehicle-mounted radio telephone. The adapter unit includes a first, resident, down-link transceiver operating at radio frequencies outside of the cellular frequency band, and adapted to receive demodulated audio and/or data signals from the resident cellular transceiver, and retransmit the signals via a low-power modulated down-link RF carrier signal to a portable remote cordless handset/transceiver. The cordless handset has a keypad, speaker, microphone and transceiver which receives down-link transmissions from the adapter unit transceiver, and transmits voice or data signals via a low-power up-link carrier signal to the adapter unit transceiver, which demodulates the information signals from the up-link carrier signal, and conveys them to the existing radio telephone transceiver for transmission at high power to the cellular network.

6 Claims, 27 Drawing Sheets